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NT				News/Trends
DI				Design International
Scan				Scanning the Field for New Ideas
3. Date of issue, MACHINE DESIGN Reference Issues are denoted by the following code:				
M				Metals (Feb. 17)
EM				Electric Motors (Apr. 13)
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71-73. Mechanics, Strength of Materials and Parts

Natural Frequencies of Beams and Plates	Snowdon	3/23	126	(4.0)
Isolating Vibration	Erhart & Salerno	7/13	112	(7.0)
Tandem Transducers Give You Just the Facts	Scan	7/13	125	(0.5)
Predicting Rotor Response	Shapiro & Benes	9/7	99	(6.0)
How Much Shake Can Bolted Joints Take?	Finkelson	10/5	122	(4.0)
Realistic Tolerances for Rotors	Bradley	11/30	67	(5.0)
Simulation Equipment: Vibration-Testing Machines	Chap- ter	EDE 11/23	166	(0.75)
Simulation Equipment: Shock-Testing Machines	Chap- ter	EDE 11/23	167	(0.3)
Quiet Snowmobile Sounds Like A Sports-car	NT	5/4	34	(0.6)
Fundamental Measurement Equipment: Sound	Chap- ter	EDE 11/23	117	(1.1)
How to Keep Bolted Joints Tight	Schremmer	9/21	140	(6.0)
How Elasticity Influences Bolted-Joint Design	Osgood	3/9	104	(4.0)
Understanding the Fundamentals of Wear	Bayer	12/28	73	(4.0)
The Cost of Fracture Control	Lange	9/7	105	(7.0)
Unmasking Hydrogen Embrittlement	McNitt	11/30	62	(5.0)
Fastener Failures Are Expensive	Trilling	12/14	130	(4.0)
Dynamic Stress in Helical Springs	Kuran	11/16	131	(3.0)
Natural Frequencies of Beams and Plates	Snowdon	3/23	126	(4.0)
A Fast Technique for Finding Vertical Column Deflections	Baumeister & Sebrosky	10/19	159	(3.0)
Deflection and Slope in Tapered Beams	Bradley	11/30	67	(5.0)
Natural Frequencies of Beams and Plates	Baumeister & Sebrosky	12/28	65	(3.0)
A Fast Technique for Finding Vertical Column Deflections	Snowdon	3/23	126	(4.0)
Realistic Tolerances for Rotors	Baumeister & Sebrosky	10/19	159	(3.0)

74. Human-Factors Engineering

Parameters Studied For Device To Keep Drunks Off The Roads	NT	4/20	36	(1.2)
Space Shuttle To Get 'Homey' Commandos	NT	9/7	10	(0.6)
Tastiest Menu Available to Skylab Crews	NT	10/5	8	(0.6)
Design A Car So Driver's Head Need Not Move	NT	11/16	18	(0.7)
Remote Health-Care Site To Be Selected	NT	12/14	18	(0.5)
Bags, Belts, or Both?	Wise	1/27	20	(6.0)

75. Design Analysis & Synthesis

What Ever Happened to the Barrel Stave? Safety Dominates New Toy Designs	Heumann	2/10	26	(5.0)
Design For Safety—Or Else!	Aronson	3/23	32	(4.0)
'Thinking' Seat Chooses Aircraft-Escape Method	Hammer	3/23	108	(8.0)
Carnage In The Courtroom	NT	5/4	12	(0.8)
Stronger Bumpers Needed By Small Cars	Wise	5/4	20	(8.0)
Radar Warns Motorist When He Is Tailgating	NT	6/1	10	(0.7)
Human Volunteers Show Air Bags Work Under Ideal Conditions	NT	6/29	6	(0.7)
Radar Not Ready For Car-Crash Sensing	NT	6/29	10	(0.7)
ESVs—Engineering Overkill Or New Era In Auto Safety?	NT	6/29	18	(0.5)
Broadcast Screen Yells Warning	Wise	7/13	20	(6.0)
Rescue Is Feasible If Skylab Encounters Trouble	Scan	7/13	125	(0.5)
BMW's "Safe" Car	NT	10/5	26	(0.8)
Italian Car Safety	DI	10/5	42	(0.5)
Man Judged Not Ready For Long Space Trips	Coppa- Zuccari	11/16	28	(2.0)
	NT	5/4	18	(0.6)
Computer Reassured Daredevil Before He Spiraled A Car	Chap- ter	EDE 11/23	166	(0.8)
Super Program Spells Doom for Cut-and-Try Design	Chap- ter	EDE 11/23	97	(0.5)
Computer Program Aids Designers	Chap- ter	EDE 11/23	98	(0.5)
The Marriage of CAD and CAM	Chap- ter	12/14	124	(6.0)
Computers: Time-Sharing	Lavoie			
Computers: Programming Services				
Computerized NC To Match Your Budget				

76. Basic Sciences & Fields

Limits Set On Faster-Than-Light Particle Emissions	NT	2/24	33	(0.7)
Rare Hyperons Produced In Quantity	NT	4/6	28	(0.7)
Fire-Fighting Technology	Aronson	11/2	20	(6.0)
Holding Dimensions Thermally Stable	Grudee	11/2	103	(5.0)

Simulation Equipment: Environmental Chambers

No Pollution When Coating Is Cured with Ultraviolet

Dog Alive And Well After Seven Days With Artificial Heart

The Electronic Hospital

Image Enhancement

Very High Speed Camera Records Metal Cutting

Troubleshooting with the SEM

Freezing the Fleeting Malfunction with high-speed photography

A Hologram Camera

Vacuum Cleaner Solves Photography

Ultrasonics To Clean Old-Car Emissions

Magnesium Stub Ups Ultrasonic Efficiency

Antisymmetrical Wing Proposed For Supersonic Flight

77. Experimental Design

The Great Mousetrap Car Race

Low-Cost Prototype P/M Parts

Prototype Shown of Superconducting Generator

78. Environmental Design

Apollo 16: Three Days In Descartes

Space Shuttle Landings To Be Simulated

In Flight Tests

Space Shuttle Decisions Reached

Chapter EDE 11/23 166 (0.8)

NT 10/5 11 (0.7)

NT 7/27 10 (1.2)

Bryson 11/16 20 (5.0)

Khol 4/20 181 (6.0)

NT 5/18 36 (0.6)

Khol 5/18 142 (3.0)

Leonard 10/5 107 (5.0)

Scan 11/2 108 (1.0)

NT 12/14 6 (0.8)

NT 3/23 6 (0.7)

Scan 4/6 99 (1.0)

NT 6/15 6 (0.7)

DC-3 Helps Plan For Space Shuttle

Man Judged Not Ready For Long Space Trips

Progress Toward Joint US/USSR Manned Space Mission

Space Shuttle to Get 'Homey' Commodes Rescue Is Feasible If Skylab Encounters Trouble

Skylab: The Real Test of Man in Space US/USSR Planners Agree On Joint Manned Space Mission

Pioneer 10 Data Surprises NASA

Will Apollo Pay Off?

Student Designers Look at Recycling

Ultrasonics To Clean Old-Car Emissions

Future Automotive Emission, Safety Standards: Too Costly? Too Soon?

Smog Laws Are Based On Unrealistic Models

L.A. Chamber of Commerce Opposes California Clean Environment Act

Hooded Rail Car To Complete Pollution Control Of Coke Plants

Rights Offered To Smoke Suppressor

Rocket Technology Borrowed For Efficient Pollution Controller

Tests Begin For Wastes-To-Water Converter

Three Schemes Outlined To Save The Environment

Variance In Smog Test Results Researched

Exhaust System Passing Toughest Federal Tests

NT 4/20 26 (0.6)

NT 5/4 18 (0.6)

NT 6/1 30 (0.5)

NT 9/7 10 (0.6)

NT 10/5 26 (0.8)

Wise 11/16 32 (5.0)

NT 11/30 18 (0.7)

NT 12/14 12 (0.5)

Bryson 12/28 20 (4.0)

Aronson 2/10 20 (3.0)

NT 3/23 6 (0.7)

NT 3/23 29 (1.0)

NT 4/6 12 (0.5)

NT 5/4 4 (0.5)

NT 5/4 8 (0.5)

NT 6/1 12 (0.5)

NT 6/1 24 (0.8)

NT 6/29 10 (0.7)

NT 7/27 13 (1.3)

NT 10/5 18 (0.6)

Article 11/2 34 (4.0)

ENGINEERING MANAGEMENT & OPERATION

81. Engineering Department Operations

Made in U.S.A.: Profile of an Invader

What the Behavior, Scientists Are Up To

In 1972: 8% More Money For R&D

Time Value of Money

Keeping Score in Business

How Much Quality Can You Afford In Fluid Power?

The Cost of Plastic Parts

Engineer's Primer on Financial Analysis: How to Spot a Company Headed for Trouble

Making Decisions Scientifically

How To Fit in with the Product-Planning Committee

Plotting Your Way to a Decision

What Good Is Technological Forecasting?

Dangers of Heavy-Handed Management

Work Ethic Not Dead, Just Changing

'Scorekeeping' Is the Key to Motivation

How to Get Your Message Across

EJC Urges New Government Program To Combat Manpower Waste

College Was Never Like This

Job Prospects Improve Slightly For New Grads

Putting Engineers Back To Work: A Tough Job

Coming: Another So-Called Engineer Shortage

Demand For Executives Remains Level

How Much Is an Engineer Worth?

NSPE Recommends Income, Benefit for Engineers

Khol 1/27 86 (8.0)

Reeser 10/5 96 (6.0)

NT 1/13 4 (1.0)

Murdick 1/13 100 (4.0)

Murdick & Petri 2/10 88 (5.0)

Boulden 3/23 116 (4.0)

Wroten 5/18 123 (3.0)

Murdick & Eckhouse 10/19 136 (8.0)

Reeser 6/29 52 (6.0)

Bickford 11/16 120 (5.0)

Johnson 11/30 44 (6.0)

Khol 12/14 114 (7.0)

George 5/18 118 (5.0)

NT 12/14 4 (0.7)

Skousen 12/14 134 (2.0)

D'Aprix 12/28 48 (4.0)

NT 1/13 4 (0.5)

Lavoie 3/23 98 (7.0)

NT 4/6 4 (0.5)

NT 6/1 4 (1.0)

NT 10/19 4 (0.5)

NT 1/27 4 (0.5)

Lavoie 5/4 68 (8.0)

NT 9/7 4 (1.0)

Rear-End 'Signature' Sought For Automotive Radar System

Engineering Labs Can Be Fun

DC-3 Helps Plan For Space Shuttle

Troubleshooting with the SEM

Radar Not Ready For Car-Crash Sensing Sub 'Dives' 2,300 ft In Pressure Chamber

Icing Simulator

The Fundamentals of Testing Hydraulic Products

An Ultrasonic Peeler into Gray Iron

Italian Car Safety

Skylab: The Real Test of Man in Space

Tester Accurately Simulates Fastener Loosening Forces

Hydraulic Models: Solving Major Problems in Miniature

Fundamental Measurement Equipment: Nondestructive Testing

Fundamental Measurement Equipment: Property Tests

Simulation Equipment: Vibration-Testing Machines

Simulation Equipment: Shock-Testing Machines

Federal Labs To Validate Performance of Inventions

Robot Balloon: New Eye For The Military?

Will Apollo Pay Off?

NT 2/10 32 (0.8)

Chapter 4/6 30 (3.0)

NT 4/20 26 (0.6)

Khol 5/18 142 (3.0)

NT 6/29 18 (0.5)

NT 7/13 6 (0.5)

DI 7/27 34 (0.5)

Stockwell 7/27 78 (4.0)

Scan 7/27 98 (0.7)

Coppa 11/16 28 (2.0)

Zuccari 11/16 32 (5.0)

NT 11/30 10 (0.8)

Aronson 11/30 20 (5.0)

Chapter EDE 11/23 119 (1.0)

Chapter EDE 11/23 166 (1.1)

Chapter EDE 11/23 166 (0.8)

Chapter EDE 11/23 167 (0.3)

NT 12/28 4 (0.5)

NT 12/28 6 (0.6)

Bryson 12/28 20 (4.0)

82, 83. New Product Development, Drafting & Reproduction

In 1972: 8% More Money For R&D

Made In U.S.A.: 2: America Fights Back

Safety Dominates New Toy Designs

When Is A Product Obsolete?

Made in U.S.A.: 3: Look Abroad for Bright Ideas

U.S.A. 4: Design For Global Markets

U.S.A. 5: Victory Through Brainpower

How To Fit in with the Product-Planning Committee

Estimating Drafting Time: Art, Science, or Guesswork

The Instant Draftsman

Drafting Equipment: Manual Drafting

Drafting Equipment: Automatic Drafting

Laser Burns Its Message Into Metal-Coated Microfilm

Reproduction Equipment: Copiers

Reproduction Equipment: Duplicators

Reproduction Equipment: Microfilm

NT 1/13 4 (1.0)

Zimmerman 3/9 84 (6.0)

Aronson 3/23 32 (4.0)

Levesque 4/20 170 (5.0)

Aronson 5/4 76 (7.0)

Zimmerman 7/13 94 (8.5)

Khol 9/21 110 (12.0)

Bickford 11/16 120 (5.0)

Raimondi 9/7 94 (5.0)

Lavoie 4/6 68 (5.0)

Chapter EDE 11/23 3 (2.4)

Chapter EDE 11/23 5 (1.3)

NT 11/16 39 (1.0)

Chapter EDE 11/23 103 (1.4)

Chapter EDE 11/23 104 (0.7)

Chapter EDE 11/23 105 (2.4)

Lawyers Offer Engineers New Way to Moonlight

3,754 Technical Employees Go Union

The Engineer and Politics

The Candidates and Technology

Look Who's Getting Involved

A Little Art Can Make You A Better Engineer

LeMouse Racers Begin To Roll

LeMouse 5000 Champions

Design Professionals Insurance Co. Expands Operations

The Societies Search for Relevance

Lavoie 7/13 107 (5.0)

Pohs 4/20 186 (4.0)

Boulden 7/13 102 (4.5)

Petrolino 3/9 93 (2.0)

D'Aprix 10/5 102 (5.0)

NT 11/30 4 (0.5)

NT 1/27 4 (0.5)

Lavoie 2/24 66 (6.0)

Aronson 10/19 30 (5.0)

Lavoie 1/12 82 (7.0)

Ritter 3/9 90 (3.0)

Wise 4/20 30 (5.0)

Article 7/13 8 (2.3)

NT 4/6 4 (0.5)

Lavoie 6/15 98 (7.0)

COMPLETE MACHINES

911. Ordnance

Helmet-Mounted Sights Ready For War.
RPVs: The End of Manned Military Flight?
Surface Control Ship: New Watchdog for Our Convoys
SCAD: Proposed Help For Bombers
What's New In U.S. Warplanes?
Is the Battle Tank Dead?
New Gun Designs for War and Peace

NT 3/9 12 (0.5)
Aronson 4/20 20 (5.0)
Article 6/1 26 (3.0)
NT 6/1 30 (0.5)
Article 7/13 28 (1.0)
Article 7/27 30 (2.0)
Article 11/2 30 (2.0)

Transpo 72	Wise & Aronson 6/29 20 (6.0)
What's New In U.S. Warplanes?	Article 7/13 28 (1.0)
Ice Is the Enemy	Aronson 7/27 20 (6.0)
Icing Simulator	DI 7/27 34 (0.5)
The New Generation Takes on Vehicle Pollution	Aronson 9/7 20 (6.0)
VW's New Top Model?	DI 9/7 30 (0.6)
1973s Are Here, Will There Be Any '76s?	Wise 9/21 20 (8.0)
BMW's 'Safe' Car	DI 10/5 42 (0.5)
BMW 520 Auto	DI 10/19 40 (0.5)
Italian Car Safety	Coppa-Zuccari 11/16 28 (2.0)
Foreign Car Review	DI 11/30 30 (2.0)
Viking: New 'Workhorse' Air Cushion Vehicle	NT 12/14 18 (0.5)
Rebirth of the Plastic Car?	Bryson 12/14 22 (5.0)
Britain's High-Speed Hovertrain	Morse 12/14 30 (4.0)
Prototype Amphibian	DI 12/14 38 (0.5)
Magnets Float Their First U.S. Vehicle	NT 12/28 26 (1.0)
Another Attempt to Revive the Blimp?	DI 12/28 32 (1.0)

912. Machinery

Oil-Lapping Catamaran
Huge Parts Float On Air To Machining Stations
Refuse Rollers
Hooded Rail Car To Complete Pollution Of Coke Plants
Corner-Turning Conveyor System Designed For Mines
Ice Is the Enemy
Wood Chips Practical for Landscaping Highways
Modular is Ultraquiet and Supersafe
Machine Tool '72

DI 1/13 40 (0.6)
NT 1/27 8 (0.7)
DI 4/20 48 (0.5)
NT 5/4 8 (0.5)
NT 6/1 6 (0.5)
Aronson 7/27 20 (6.0)
NT 9/21 8 (0.5)
NT 9/21 37 (1.0)
Khol 10/19 19 (8.0)

915. Instruments

Quartz-Controlled Watches and Clocks	Article 1/27 30 (4.0)
The New-Generation Oscilloscopes	Donaldson 1/27 94 (5.0)
Keeping Tabs On Torque	Valentich 2/10 104 (4.0)
Students' Machine Puts Big Animals To Sleep	NT 2/24 31 (0.5)
Do You Really Understand Surface Texture?	Khol 4/6 86 (6.0)
Telescopes Get TV-Type Eyes	NT 5/18 31 (0.6)
New Point-and-Shoot Camera Design	Article 5/18 34 (2.0)
Very High Speed Camera Records Metal Cutting	NT 5/18 36 (0.6)
Troubleshooting with the SEM	Khol 5/18 142 (3.0)
The Electronic Hospital	Bryson 11/16 20 (5.0)
Fundamental Measurement Equipment: Dimension	Chap-ter EDE 11/23 116 (0.5)
Fundamental Measurement Equipment: Time	Chap-ter EDE 11/23 116 (0.9)
Fundamental Measurement Equipment: Sound	Chap-ter EDE 11/23 117 (1.1)
Fundamental Measurement Equipment: Light	Chap-ter EDE 11/23 118 (1.1)
Mechanical Measurement Equipment: Stress and Strain	Chap-ter EDE 11/23 130 (1.3)
Mechanical Measurement Equipment: Force	Chap-ter EDE 11/23 131 (0.9)
Mechanical Measurement Equipment: Torque and Power	Chap-ter EDE 11/23 132 (0.8)
Mechanical Measurement Equipment: Motion	Chap-ter EDE 11/23 133 (1.8)
Temperature Measurement Equipment: Direct Measurement	Chap-ter EDE 11/23 160 (1.9)
Temperature Measurement Equipment: Indirect Measurement	Chap-ter EDE 11/23 162 (1.0)
Inside Polaroid's SX-70	Scan 12/14 150 (1.5)

913. Electrical Machinery

Horn Blast Is Radioed to Car Ahead
Radar Warns Motorist When He Is Tailgating
Radar Not Ready For Car-Crash Sensing
Experimental TV LP

NT 2/24 8 (0.5)
NT 6/29 6 (0.7)
NT 6/29 18 (0.5)
DI 11/2 42 (0.7)

914. Transportation

Utilities Back Electric Cars
Bags, Belts, or Both
Ford Imports Jap Truck To Fight Toyota/Datsun Invasion
Wagons Will Determine Minicar Sales Winner
Sigma Gets It All Together
Lear's Steamer Heads for San Francisco
Will STOL Take Off This Time?
93 Teams Entered In Urban Car Contest
NASA Calls For Jupiter-Saturn Mission 'Revolutionary' Indy-500 Car Designed, Tested In 5 Months
Space Shuttle Landings To Be Simulated In Flight Tests
Multimode Boat
Quiet Snowmobile Sounds Like A Sports-car
Aerospace Artists Show Two Ideas
Transit Vehicles To Be Built From Modular Unit
Indianapolis 1972: One, Two, Three, Parnelli?
Military Satellite
Stronger Bumpers Needed By Small Cars
Muscles for the Minicars
Versatile Vehicle Designed For Developing Nations

Wise 1/13 28 (5.0)
Wise 1/27 20 (6.0)
NT 2/10 10 (0.7)
NT 2/24 18 (1.0)
Morse 3/9 20 (2.0)
Article 3/9 24 (3.0)
Aronson 3/9 30 (4.0)
NT 3/23 18 (0.7)
NT 4/6 10 (0.5)
NT 4/6 18 (0.7)
NT 4/20 18 (0.5)
DI 4/20 42 (0.5)
NT 5/4 34 (0.6)
NT 5/18 8 (0.6)
NT 5/18 18 (1.0)
Wise 5/18 20 (7.0)
DI 5/18 47 (0.5)
NT 6/1 10 (0.7)
Aronson 6/1 20 (3.0)
NT 6/15 10 (0.8)

Using the classification system provides nine major (one-digit) classifications, each of which has up to nine (two-digit) sub-classifications. These, in turn, are divided into ten (three-digit) indexing classifications.

Indexing classifications ending in 0 (General) are used to index material concerning several or all indexing classifications ending in 1 through 8. Classifications ending in 9 (Other) are used for material falling within the sub-classification but not within any of the items 1 through 8.

1—ELECTRICAL & ELECTRONIC

11 Motors
110 General
111 Fractional (less than 1 hp)
112 Ac integral horsepower
113 Dc integral horsepower
114 Universal (dc and ac)
115 Multispeed
116 Gearmotors
117 Torque
118 Definite and special purpose
119 Other (linear)
12 Power Supplies
120 General
121 Batteries (dry and wet)
122 Dc generators, motor-generators
123 Ac generators (alternators), motor-generators
124 Converters, inverters
125 Transformers
126 Fuel cells, solar cells, photo cells
127 Thermoelectric supplies
128
129 Other
13 Switches & Relays
130 General
131 Mechanical (pushbutton, lever, rotary, mercury)
132 Thermally operated (thermostats)
133 Pressure operated
134 Limit (snap action)
135 Proximity, photoelectric
136 Stepping
137 Relays, circuit breakers
138 Motor starters (motor controls)
139 Other (reed)
14 Instruments & Controls
140 General
141 Sensing devices (transducers, thermocouples)
142 Solenoids, electric actuators
143 Timers, timing motors, delays
144 Syncros
145 Instrument motors (synchronous)
146 Data recorders, readouts, indicators, displays
147 Meters, gages
148 Servo motors, stepping motors
149 Other
15 Circuit Components
150 General

2—FLUID POWER

21 Fluids
210 General
211 Hydraulic fluids
212 Coolants
213
214
215
216
217
218
219 Other
22 Fluid Conditioners
220 General
221 Fluid storage (pressure vessels, reservoirs)
222 Filters, strainers, screens
223 Renovators
224 Heat exchangers
225 Coolers, radiators
226 Heaters
227 Driers
228
229 Other
23 Fluid Conductors
230 General
231 Tubing (pressure)
232 Hose
233 Pipe
234 Fittings
235 Joints, couplings, unions
236 Mufflers
237
238
239 Other
24 Linear Devices
240 General
241 Cylinders
242 Accumulators
243 Intensifiers
244 Actuators (bellows, diaphragms)
245 Pumps (linear)
246
247
248
249 Other
25 Rotary Devices
250 General
251 Pumps (rotary)
252 Fluid motors
253 Air motors

3—MECHANICAL

31 Power Sources
311 General
312 Jet engines
313 Internal-combustion engines
314 Turbines
314 Atomic, nuclear power
315 Exotic fuel engines (rockets)
316 Fuels, propellants, explosives
317 Steam
318
319 Other
32 Constant-Speed Drives & Transmissions
320 General (speed reducers)
321 Chain
322 Belt
323 Friction (ball, disc, wheel, cone)
324 Gear
325
326
327
328
329 Other
33 Adjustable-Speed Drives & Transmissions
330 General (speed reducers)
331 Chain
332 Belt
333 Friction (ball, disc, wheel, cone)
334 Gear
335
336
337
338
339 Other
34 Drive Components
340 General
341 Transmission chain, cable
342 Belts, belting
343 Gears, gearing, racks
344 Sprockets
345 Pulleys, sheaves, idlers, tensioners
346 Conveyor chain, conveyor cable, conveyor belt
39 Systems
390 General

4—ASSEMBLY COMPONENTS

41 Fasteners
410 General
411 Inserts
412 Nuts, lock nuts
413 Pins, dowels
414 Quick operating (panel-type, latches)
415 Retaining rings, keys, collars
416 Rivets
417 Screws, bolts, studs
418 Washers, grommets, eyelets, spacers
419 Other (spring clips, clamps, zippers)
42 Springs & Isolation Devices
420 General
421 Fluid & air springs
422 Helical-wire springs
423 Leaf springs
424 Vibration isolators, mounts
425 Hydraulic-damping devices (shock absorbers, snubbers)
49 General
490 General

5—MATERIALS

51 Ferrous Metals
510 General
511 Cast iron, malleable iron, cast carbon, alloy steels
512 Wrought carbon, alloy steels
513 Free-machining steels
514 Stainless steels, high alloys, high-temperature steels
515 Specialty steels (tool, die, electrical)
516
517
518
519 Other
52 Nonferrous Metals
520 General
521 Aluminum
522 Copper, Brass, Bronze
523 Magnesium
524 Nickel
525 Titanium
526 Zinc
527 Refractory metals (tungsten, tantalum, molybdenum, columbium)
528 Precious metals
529 Other
53 Plastics
530 General
531 Thermoplastic plastics (nylon, Teflon)
532 Thermosetting plastics (epoxy, phe-
nolic, filled silicones, rigid urethanes)
533 Laminated plastics, vulcanized fiber
534 Reinforced, filled plastics
535
536
537
538
539 Other
54 Rubber & Elastomer
540 General
541 Natural rubber
542 Synthetic rubber
543 Elastomeric plastics (flexible silicones & urethanes)
544 Hard rubber
545
546
547
548
549 Other
55 Joining Materials
550 General
551 Adhesives, sealants, encapsulants
552 Welding rods
553 Brazing, soldering alloys
554
555
556
557

5—MATERIALS (continued)

558	575 Plastic coatings
559 Other	576 Lubricating materials
56 Other Nonmetals	577 Cleaners, solvents
560 General	578
561 Carbon, graphite, diamonds	579 Other (corrosion inhibitors)
562 Glass, ceramics	
563 Refractory materials, mica	
564 Carbides, cermets	
565 Mineral & synthetic fibers, felt	58 Prefabricated Forms
566 Insulating materials (thermal, sound)	581 Film, tape, sheet, foil
567 Wood, cork, composition board, paper	582 Wire, wire cloth, wire rope, cable
568 Chemicals	583 Patterned, perforated, expanded
569 Other (abrasives, friction materials)	metals, textured, prefinished
57 Finishes, Coatings & Lubricants	584 Laminates (other than laminated
570 General	plastics)
571 Metallic coatings	585 Composite materials
572 Chemical coatings, electrochemical	586 Structures (honeycomb, foam, sand-
coatings, photosensitive	wich)
573 Organic finishes (lacquers, synthetic enamels), paints, varnishes	587 Structural shapes (tubing, channels)
574 Porcelain enamels, vitreous coatings	588 Balls
	589 Other
	59 General
	590 General

7—DESIGN THEORY & TECHNIQUES (continued)

75 Design Analysis & Synthesis	770 General
750 General	771 Prototypes, breadboards
751 Mathematical methods (statistics)	772 Testing (stress analysis)
752 Graphical techniques	773
753 Analogs, models, simulators	774
754 Computer techniques	775
755 Reliability, quality control	776
756 Dimensioning (tolerances)	777
757	778
758	779 Other
759 Other	
76 Basic Sciences & Fields	78 Environmental Design
760 General	780 General
761 Physics	781 Corrosion, rust
762 Chemistry	782 Mold, fungus
763 Thermal (cryogenics, heat transfer)	783 Outer space
764 Radiation	784 Under sea
765 Biosciences	785 Pollution
766 Optics (photography, holography)	786
767 Ultrasonics	787
768	788
769 Other (economics)	789 Other
77 Experimental Design	79 General
	790 General

6—MANUFACTURING PROCESSES

61 Metal Casting	651 Planing, broaching
610 General	652 Lathe, screw machining
611 Sand	653 Milling, hobbing, gear shaping
612 Shell mold	654 Drilling, boring
613 Permanent mold	655 Grinding, abrasive machining
614 Centrifugal	656 Honing, lapping, polishing
615 Investment	657 High-energy machining (spark, laser)
616 Die	658
617	659 Other
618	
619 Other	66 Metal Treating
	660 General
	661 Heat treating
	662 Surface treating (carburizing, nitriding)
	663 Shot peening, surface working
	664 Chemical milling, etching
	665
	666
	667
	668
	669 Other
	67 Finishing
	670 General
	671 Chemical, solvent cleaning
	672 Mechanical finishing
	673 Conversion coating (anodizing) electro-polishing
	674 Electropolishing, vacuum metallizing
	675 Metal spraying (flame spraying), hard facing
	676 Painting
	677
	678
	679 Other
	68 Plastics & Rubber Processes
	680 General
	681 Molding
	682 Extrusion
	683 Sheet forming
	684 Laminating
	685 Casting
	686 Stamping, machining, fabricating, forming
	687 Calendering, coating
	688 Encapsulation
	689 Other (filament winding)
	69 General
	690 General (automatic assembly, sewing)

7—DESIGN THEORY & TECHNIQUES

71 Mechanics	73 Strength of Parts
710 General	730 General
711 Statics (at rest)	731 Tension, compression
712 Dynamics (force to create motion)	732 Bending
713 Kinematics (motion in abstract)	733 Shear, torsion
714 Vibration, natural frequency	734 Surface contact stress
715 Shock	735 Plates
716 Noise, sound, music	736 Cylinders, columns
717	737 Rotating discs
718	738
719 Other	739 Other
72 Strength of Materials	74 Human-Factors Engineering
720 General	740 General (life support)
721 Elastic theory	741 Styling
722 Plastic theory	742 Color
723 Fatigue, endurance	743 Safety
724 Creep	744 Illumination
725 Impact stress	745 Human limitations
726 Thermal stress	746
727 Friction, wear	747
728 Fracture	748
729 Other	749 Other

8—ENGINEERING MANAGEMENT & OPERATION

81 Engineering Department Operations	854 Report writing, articles, papers, oral
810 General	855 Part numbering
811 Structure, organization	856 Engineering records
812 Costs, budgets	857
813 Programming, planning	858
814 Personnel policies	859 Other
815 Recruiting, evaluation, training	
816 Managerial talent	
817 Compensation	
818	
819 Other	82 New Product Development
	820 General
	83 Drafting & Reproduction
	830 General
	831 Management, control systems
	832 Drafting practices, techniques
	833 Technical illustration
	834 Drafting equipment
	835 Reproduction equipment, systems (microfilm)
	836 Furniture
	837
	838
	839 Other
	840 General
	84 Laboratory & Testing
	841 General
	85 Technical Information
	850 General
	851 Engineering libraries, files, books
	852 Information classification, retrieval
	853 Specifications, standards
	86 Patents & Patent Law
	860 General
	87 Personal & Professional
	870 General
	871 Creativity, inventiveness
	872 Meetings, shows
	873 Other personal
	874 Societies
	875 Professional licensing
	876 Unions
	877
	878
	879 Other professional
	88 Outside Services
	880 General
	881 Engineering design services
	882 Industrial design services
	883
	884
	89 General
	890 General

9—MISCELLANEOUS

91 Complete Machines	915 Instruments (medical, dental, photographic, watches, SIC 38)
910 General	916 Fabricated metal products (hand tools, etc., SIC 34)
911 Ordnance (tanks, missiles, rockets, ammunition, SIC 19)	917
912 Machinery (agricultural, construction, machine tools, office machinery, materials handling, SIC 35)	918
913 Electrical machinery (communications, radio, radar, TV, appliances, X-ray, SIC 36)	919 Other
914 Transportation (automotive, aircraft, ships, railroad, space craft, undersea craft, SIC 37)	
99 Unclassified	
990 General (includes pages such as Editorials, "Back Talk," Covers, Contents Pages, etc.)	

